LDCM Surface reflectance product status

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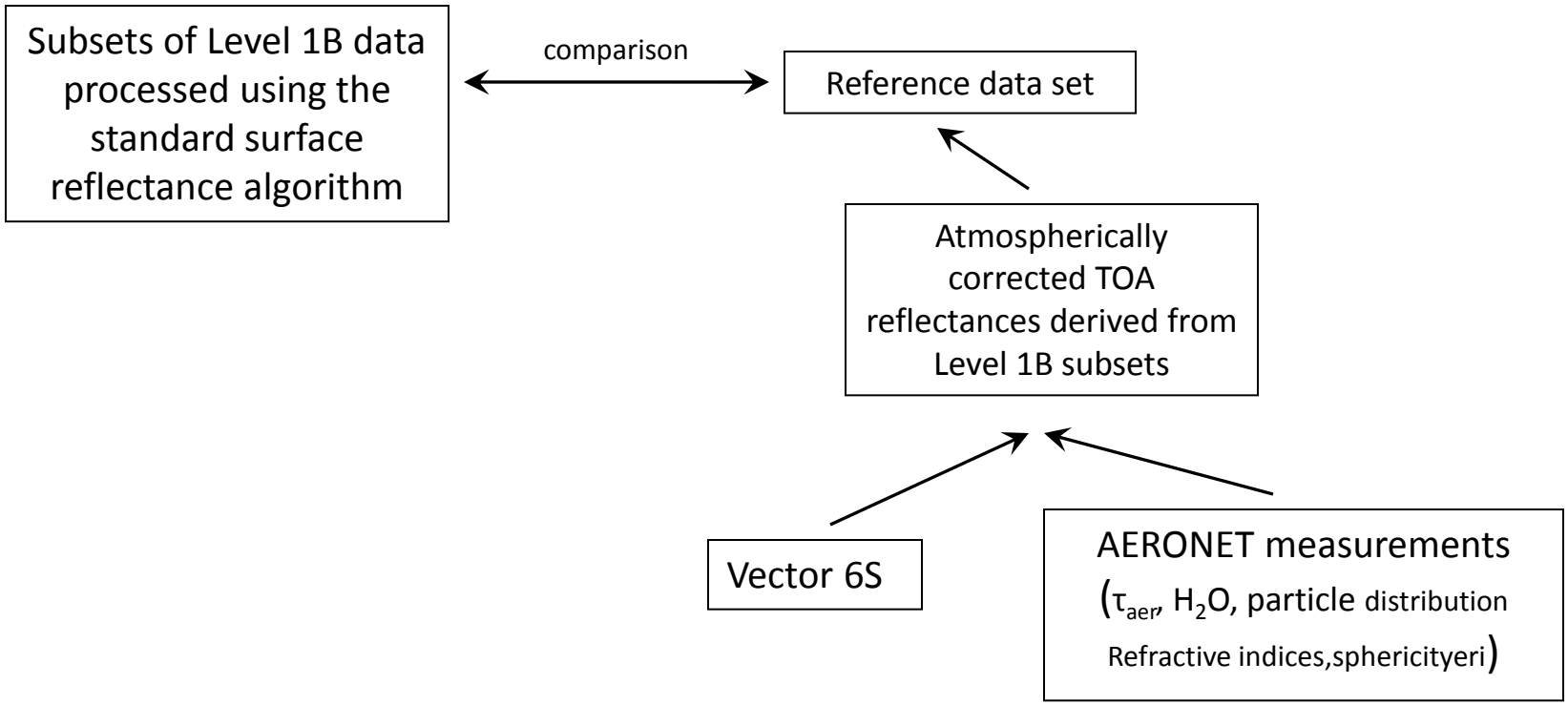
Methodology for evaluating the performance of surface reflectance product (generic)



Validation Metrics

- Accuracy (A) = the bias

$$A = \frac{1}{N} \times \sum_{i=1}^{N} \varepsilon_i$$

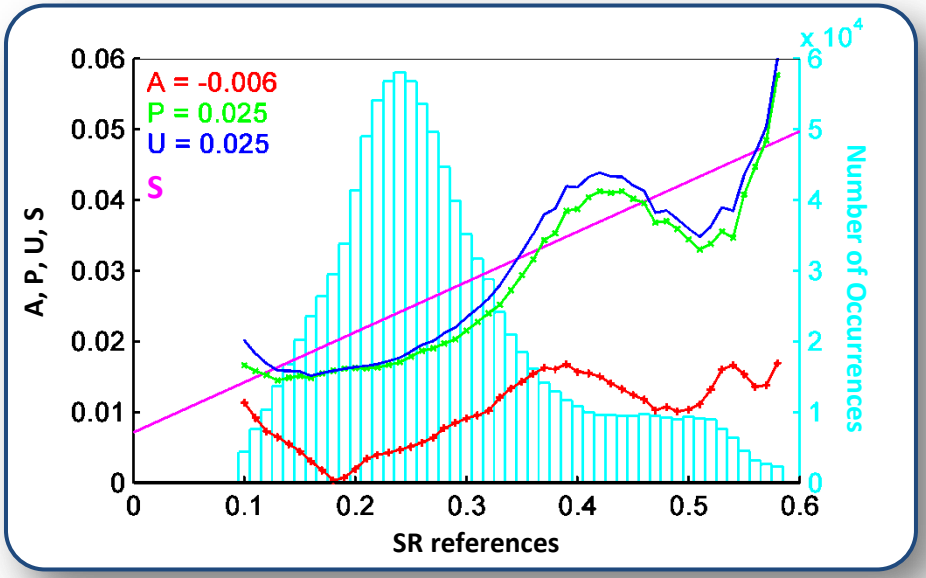
- Precision (P) = the repeatability

$$P = \sqrt{\frac{1}{N-1} \times \sum_{i=1}^{N} (\varepsilon_i - A)^2}$$

- Uncertainty (U) = the actual statistical deviation

$$U = \sqrt{\frac{1}{N} \times \sum_{i=1}^{N} \varepsilon_i^2}$$

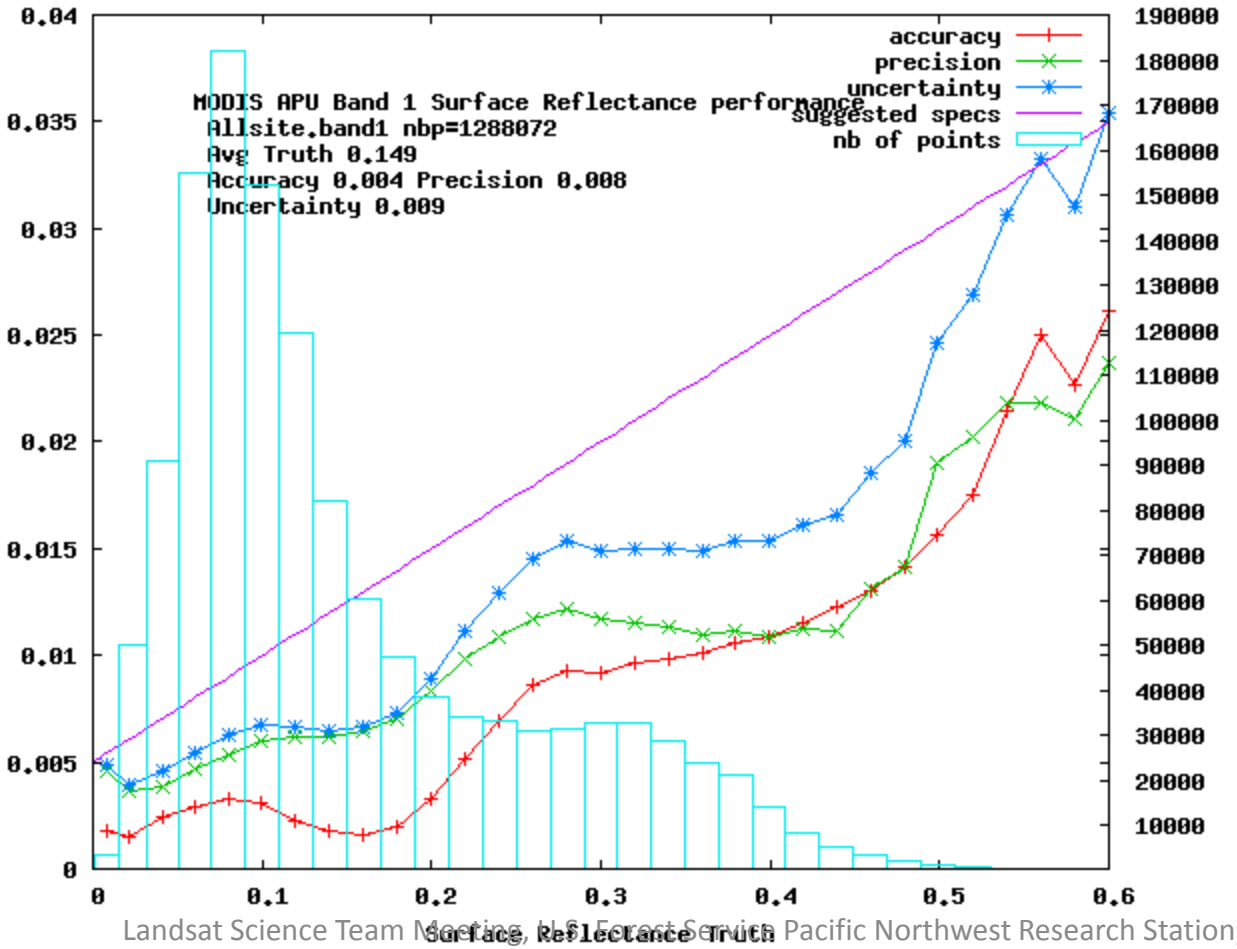
$$U^2 = \frac{\sum_{i=1}^{N} \left(\mu_i^e - \mu_i^t - A + A\right)^2}{N} = \frac{N-1}{N} P^2 + A^2$$



- Specification (S) = Uncertainty requirement

From Vermote and Kotchenova, 2008

Quantitative assessment of performances (APU over AERONET) MODIS Collection 5

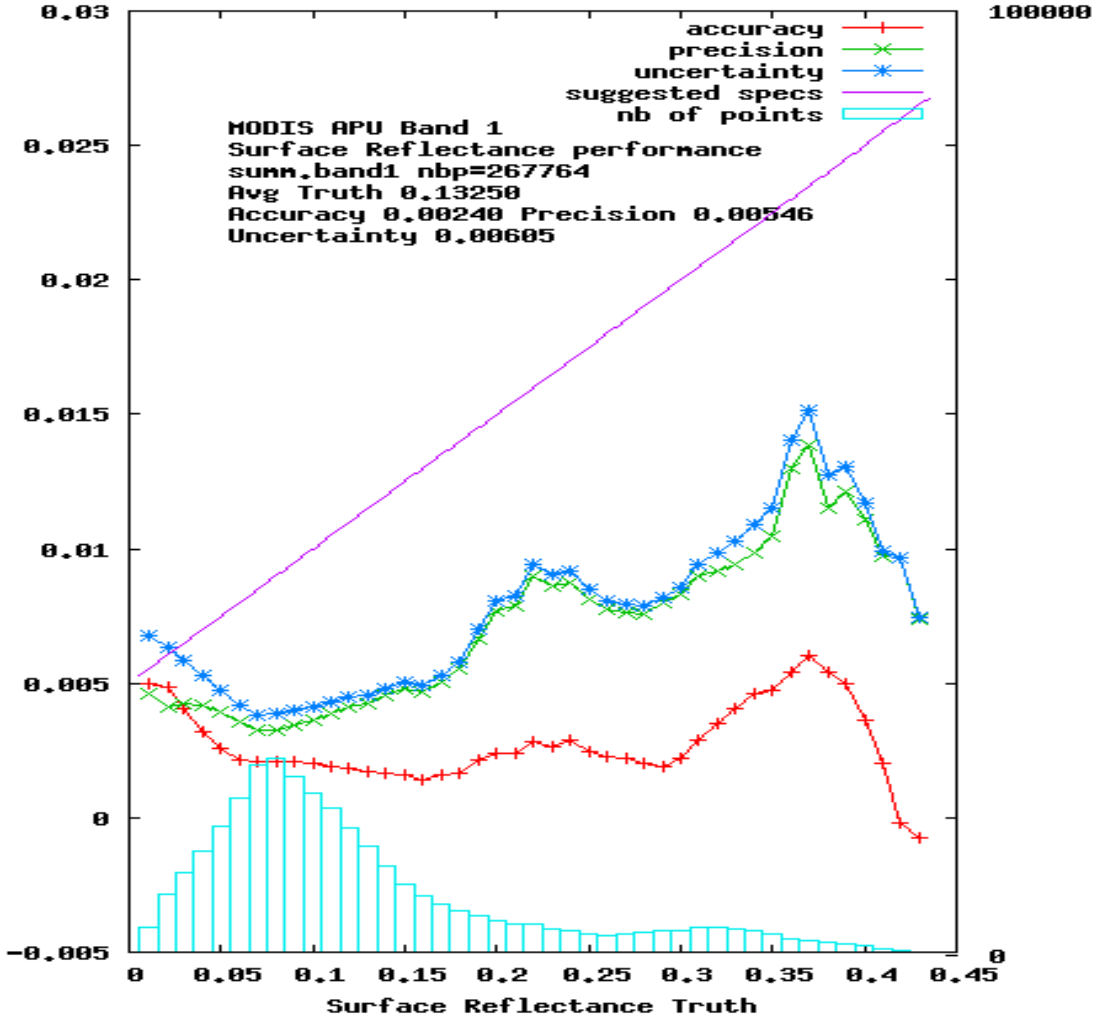


1,3 Millions 1 km pixels were analyzed for each band.

Red = Accuracy (mean bias)
Green = Precision (repeatability)
Blue = Uncertainty (quadatric sum of A and P)

On average well below magenta theoretical error bar

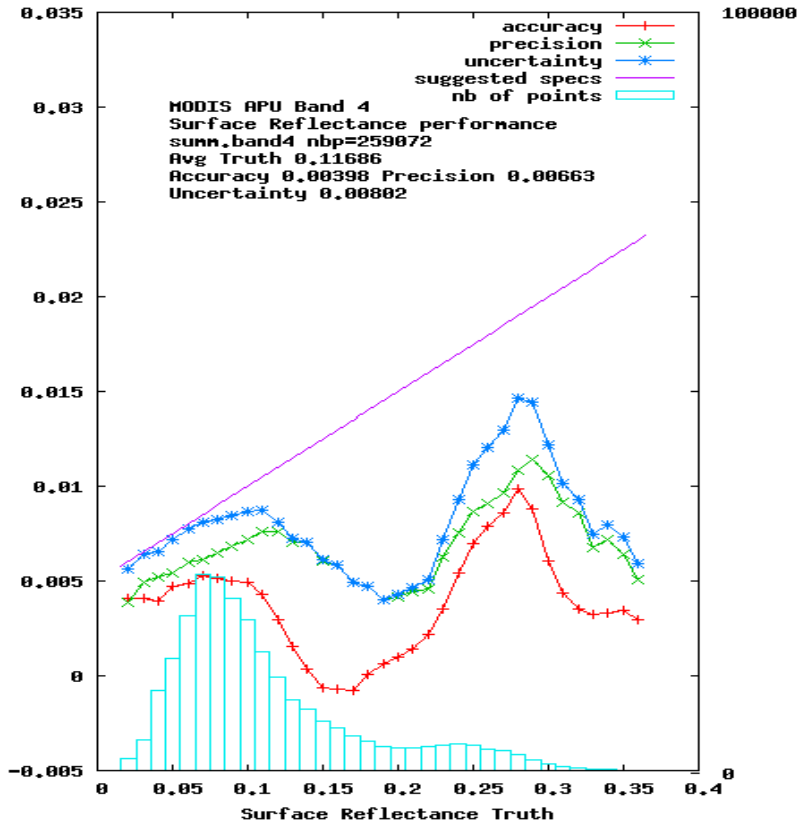
Quantitative assessment of performances (APU over AERONET) MODIS Collection 6

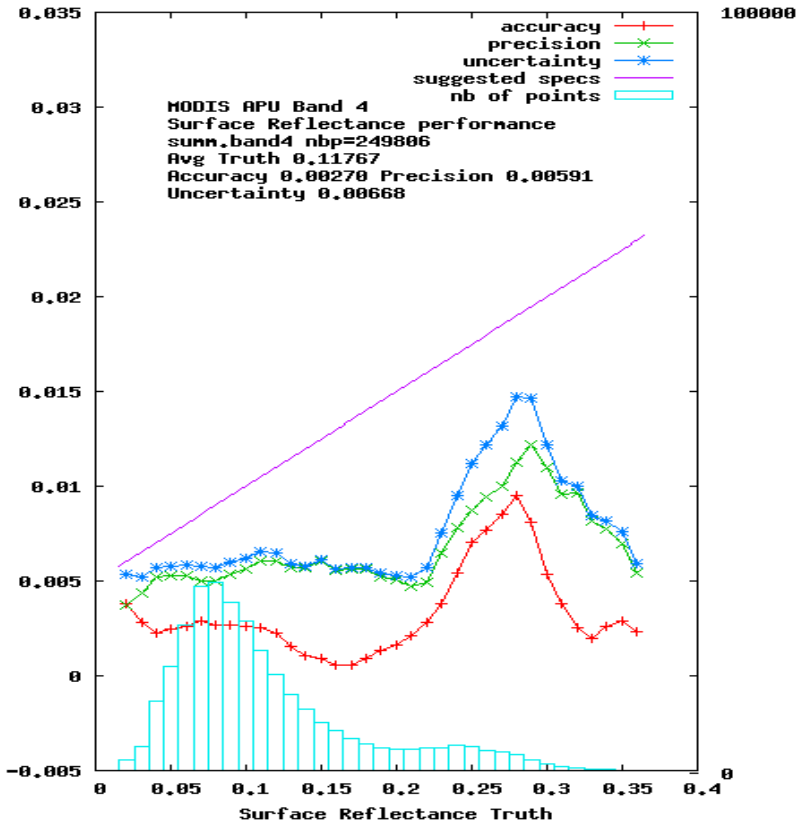


Red = Accuracy (mean bias)
Green = Precision (repeatability)
Blue = Uncertainty (quadatric sum of A and P)

Great improvement seen across the range of reflectance (even on bright targets)

Improving the aerosol retrieval in collection 6 reflected in APU metrics

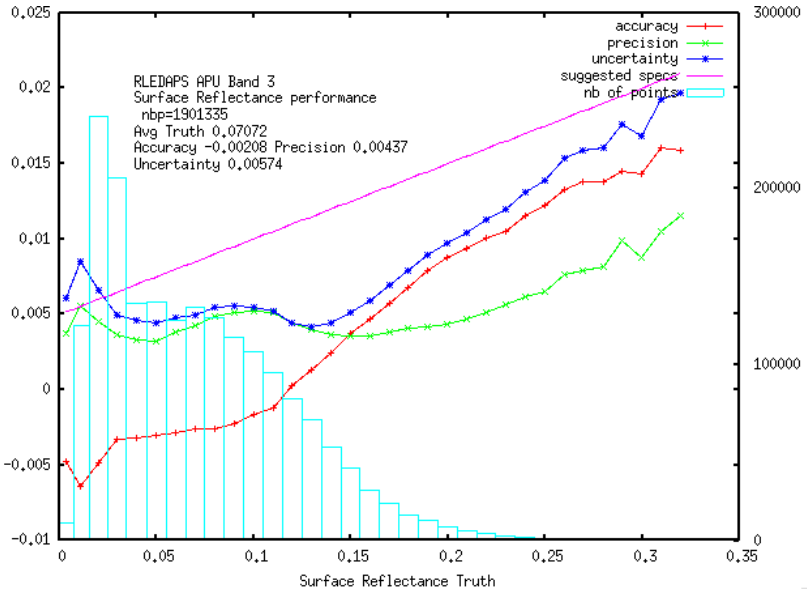




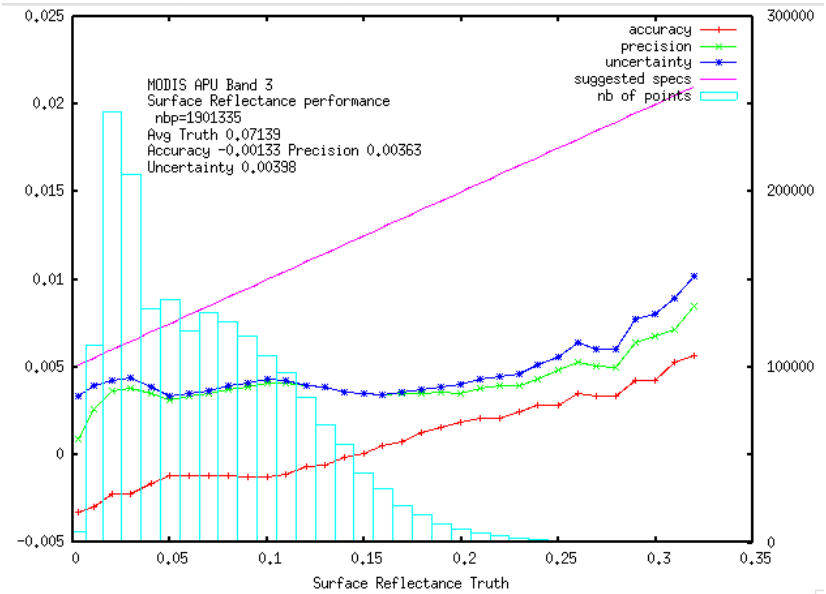
The performance of the reflectance product for band 4 (550nm) for the fixed ratio (left side) versus spatially variable (right side), although modest the improvement in the performance of the product is clearly visible especially in the lower range of reflectance's that correspond to vegetation/forest.

WELD/LEDAPS results (Red-band3)

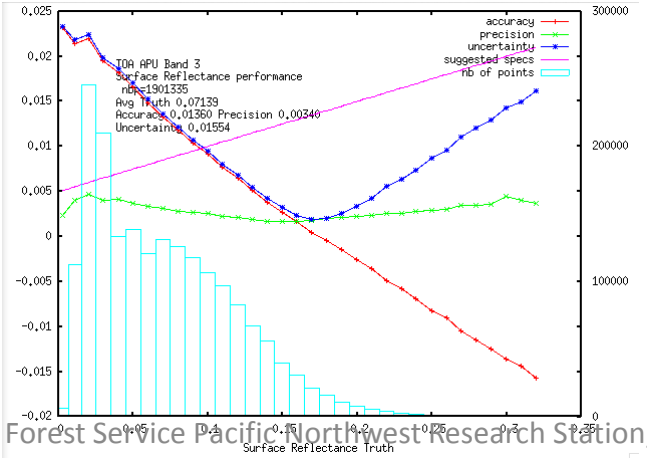
LEDAPS



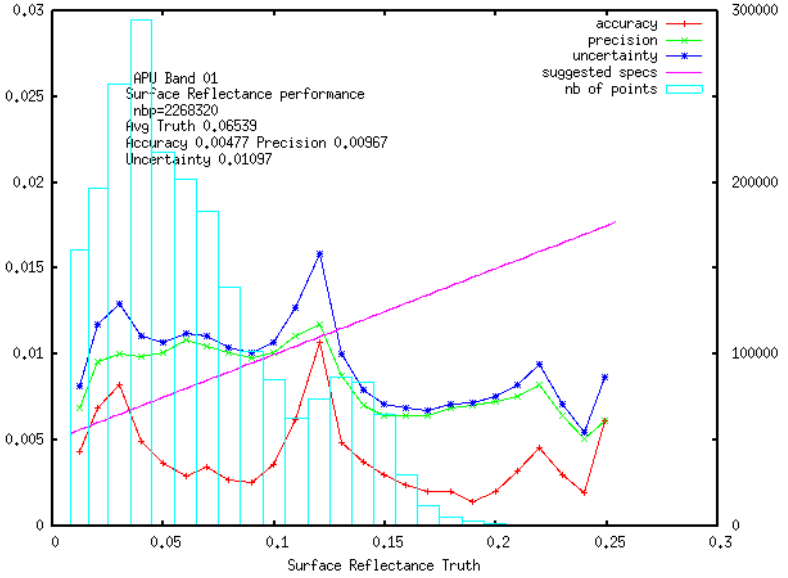
WELD uses MODIS aerosol

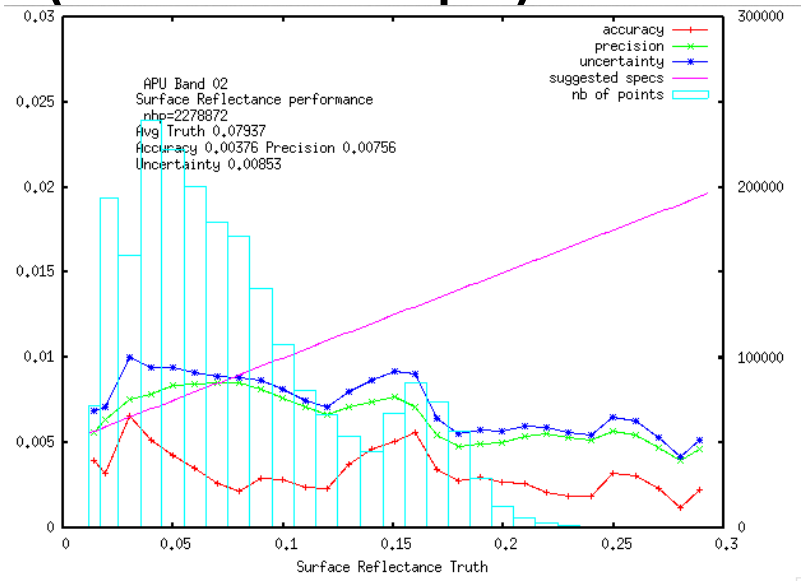


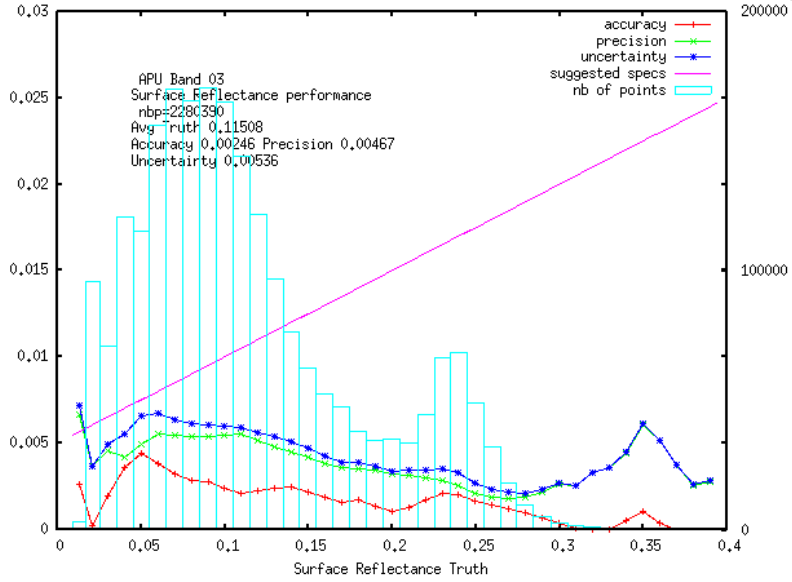
Top of the atmosphere

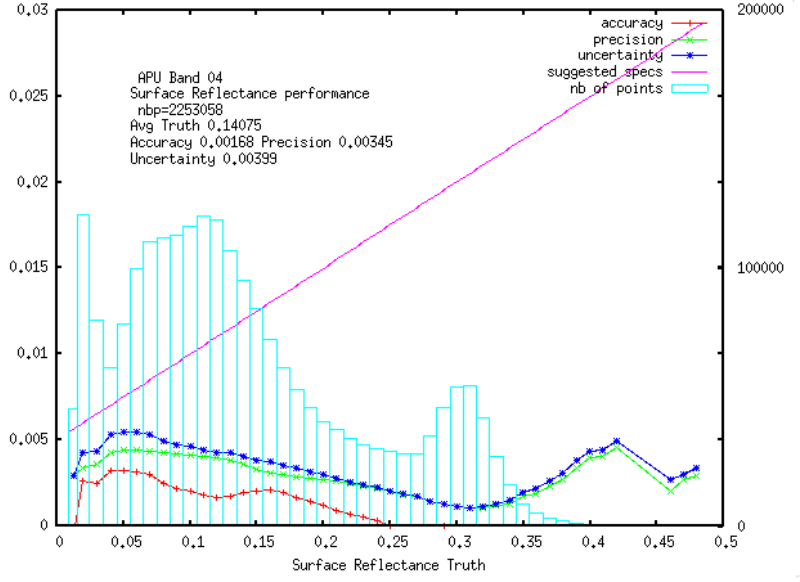


validation Landsat 8 SR (71 matchups)

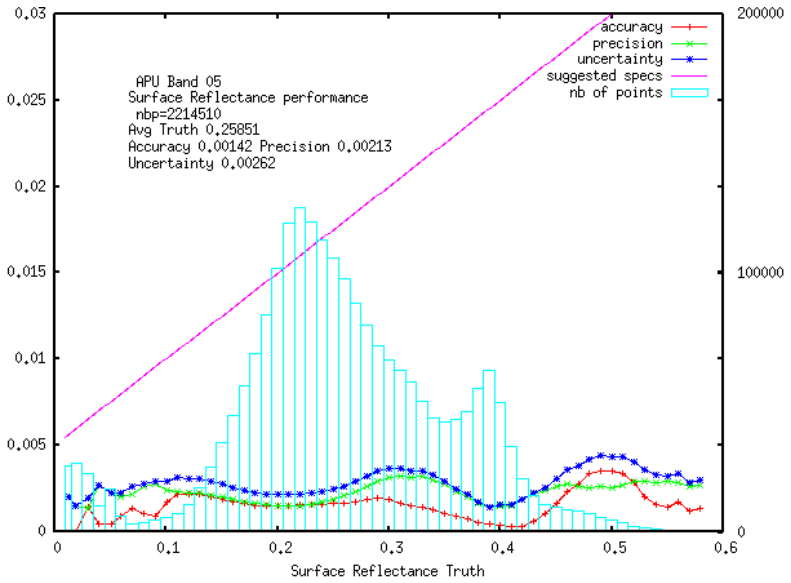


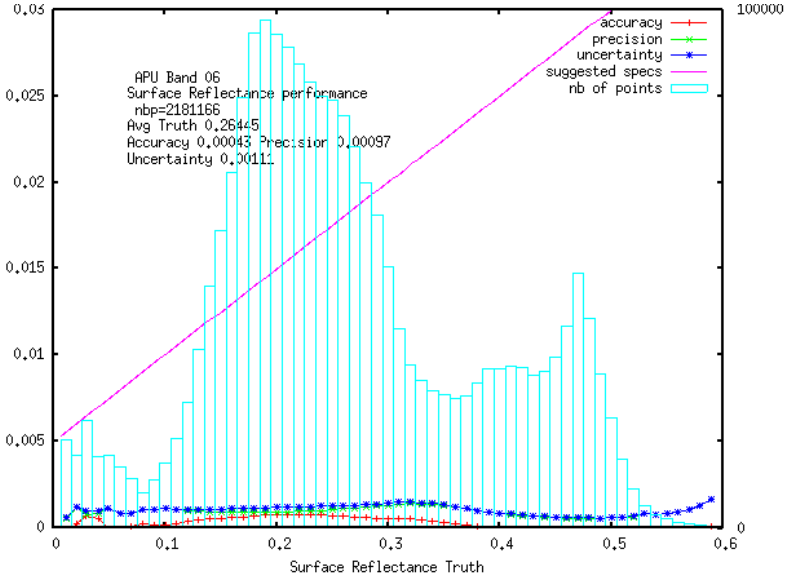


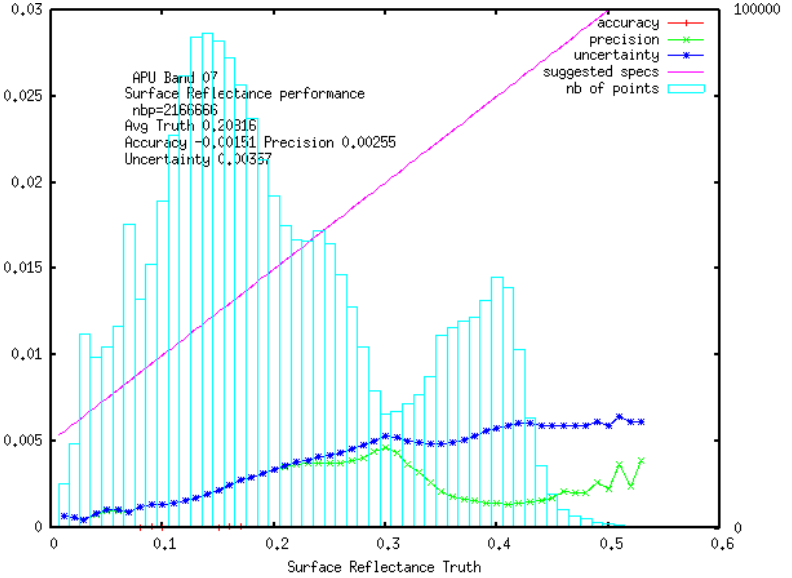


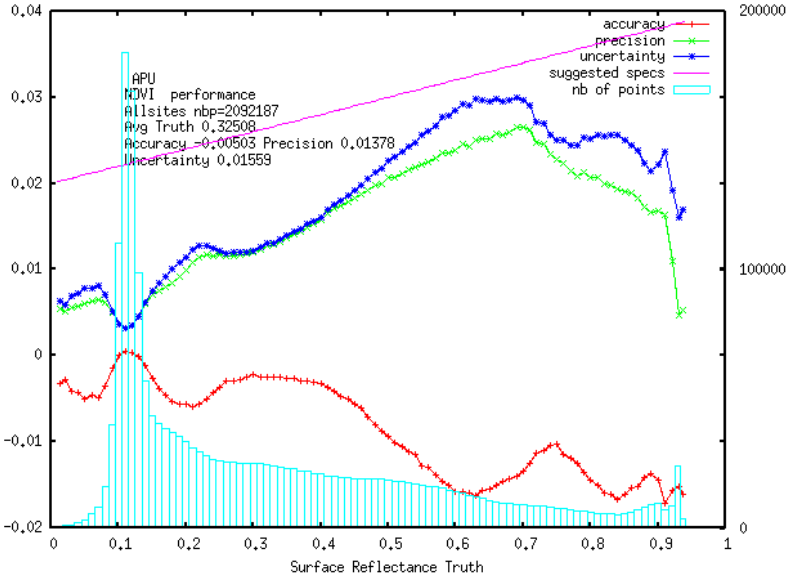


Preliminary validation Landsat 8 SR (71 matchups)









Conclusions and future steps

- Landsat8 SR is performing very well benefiting from MODIS collection 6 improvements and extra aerosol band (band1)
- Some minors improvements are needed (next version scheduled for end of month)
- A crude algorithm for retrieval over water will be implemented provisionally.